TSMSAN: A Three-Stream Multi-Scale Attentive Network for Video Saliency Detection
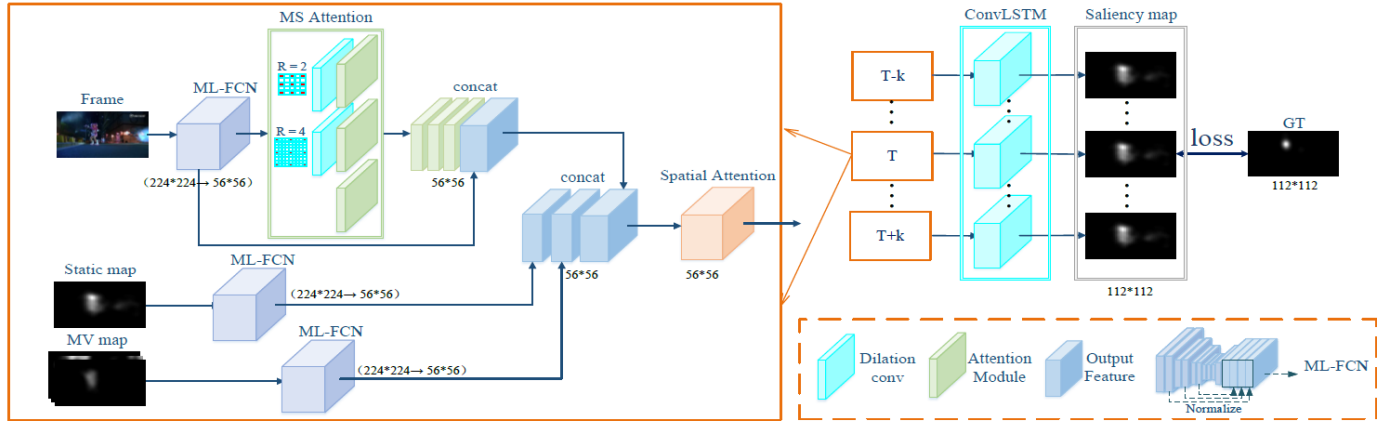
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Introduction

We proposed a three-stream multi-scale attentive network (TSMSAN) for saliency detection in dynamic scenes.

TSMSAN integrates motion vector (MV) representation, static saliency map, and RGB information in multi-scales together into one framework on the basis of Fully Convolutional Network (FCN) and spatial attention mechanism.

On the one hand, the respective motion features, spatial features, as well as the scene features can provide abundant information for video saliency detection. On the other hand, spatial attention mechanism can combine features with multi-scales to focus on key information in dynamic scenes.

Methods

TSMSAN: A three streams framework integrating motion vector (MV) representation, static saliency map, and RGB information in multi-scales, providing motion features, spatial features, as well as the scene features respectively.

a) Three Fully Convolutional Networks (FCNs) capable of extracting multi-level features are adopted in every stream.
b) Spatiotemporal features are further extracted by a spatial attention module and a convLSTM layer.
c) A Multi-Scale Attention module based on spatial attention mechanism and dilated convolution combining features with multi-scales is adopted in the stream that takes RGB frames as input.
d) The proposed network is proved to achieve excellent performance and generalization capabilities on two public dynamic saliency datasets.

Results

Results on several saliency metrics

Testing set	Method	NSS↑	CC↑	SIM↑
UCF-sports	OMCNN [20]	2.089	0.405	0.321
	Two-stream [17]	1.753	0.343	0.264
	ACLNet [23]	3.200	0.603	0.496
	TSMSAN	3.589	0.616	0.490
Hollywood-2	OMCNN [20]	2.313	0.446	0.356
	Two-stream [17]	1.748	0.382	0.276
	ACLNet [23]	3.049	0.609	0.519
	TSMSAN	3.150	0.584	0.502

Performance comparison with State-of-the-arts